

When Melatonin Gets on Your Nerves: Prevention of Neuronal Loss

Russel J. Reiter

Melatonin is phylogenetically an extremely old molecule that is present throughout the plant and animal kingdoms. This endogenously-produced indoleamine has a highly diverse functional repertoire. Among many of its actions is its high efficiency in reducing damage to critical macromolecules which compromise cellular and organismal physiology; this damage is referred to as oxidative stress and contributes to many diseases and aging. The potent actions of melatonin in reducing oxidative damage stems from the fact that not only is melatonin a highly effective free radical scavenger, but its metabolites are, in some cases, better than melatonin itself in neutralizing toxic oxygen derivatives in a series of reactions, referred to as melatonin's antioxidant cascade. In all organs, including the brain, melatonin has been shown to preserve morphological and functional integrity of cells. This is dramatically demonstrated in the brain (and the heart) where exogenously-administrated melatonin remarkably protects tissue and maintains function that is normally severely compromised by ischemia/reperfusion (called stroke in the brain and heart attack when it involves cardiac muscle). Melatonin may be especially effective in combatting oxidative damage since it seems to be a mitochondrial-target antioxidant; mitochondria are a major site of free radical generation. The findings have implications for the reduction in the severity of many diseases and for deferring signs of aging.